

**DEPARTMENT OF TRANSPORTATION - District 4 Toll Bridge Program**

333 Burma Rd.

Oakland, CA 94607

(510) 622-5660, (510) 286-0550 fax

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July 31, 2007

Contract No. 04-0120F4

04-SF-80-13.2 / 13.9

Self-Anchored Suspension Bridge

Letter No. 05.03.01-000419

Michael Flowers  
Project Executive  
American Bridge/Fluor Enterprises, a JV  
375 Burma Road  
Oakland, CA 94607

Dear Michael Flowers,

**Submittal 54, Rev. 1, DRAFT Welding Quality Control Plan**

The Department has completed review of Submittal ABF-SUB-000054R01, "DRAFT Welding Quality Control Plan (WQCP) for ZPMC," dated July 17, 2007. The submittal is returned "Approved as Noted" as shown on the attached redlined WQCP. All comments made by the Department on the WQCP are required for approval and shall be put into practice during fabrication.

Additionally, the following items supplement the written WQCP or are required to be revised in future addendums to the original WQCP, as in the case of WPS's not approved.

1. **Item 8.6** - There shall be separate drying and holding ovens.
2. The following WPS's have been revised to specify welding parameters within those allowed for procedures qualified in accordance with AWS D1.5, Section 5.12.1 (Maximum Heat Input). The 1G SAW WPS's that refer to "PQR HP2006134 - PQR," were submitted as "AWS D1.5, Section 5.12.1 Max HI," but the associated WPS's were varied in accordance with AWS D1.5, Section 5.13:
  - a. WPS-B-T-2221-B-U3c-S
  - b. WPS-B-T-2221-B-L2c-S
  - c. WPS-B-T-2221-B-L2a-3
  - d. WPS-B-T-2221-TC-U4b-S
  - e. WPS-B-T-2221-1-TC-U5-S
  - f. WPS-B-T-2122-1
  - g. WPS-345-SAW-1G(2F)-Repair
3. Revise the following fillet weld WPS's to include the maximum size single pass and minimum size multi-pass weld qualified by the associated macroetches of the fillet weld soundness plate:
  - a. WPS-B-T-2131, 2132 and 2133
  - b. WPS-B-T-2122-1 and 2122-1
  - c. WPS-B-T-3122
  - d. WPS-B-T-3111, 3112, 4111-1, 4112-1 and 4121

4. Visual acuity records were not submitted for the following CWI's and CAWI's. These personnel are not approved at this time.
  - a. **CWI's:** Ya-Dong Zhu, Weifeng Jiang, Daqing Zhou, Yuwei Zhao, Lefeng Lu, Yongjun Ye, Weidong Zhang, Hua Yan, Wenhui Xiong, Nan Wang, Jianhua Lu
  - b. **CAWI's:** Gang Hu, Guogang Fu, Zhonghai Zhu, Dongjun Yu, Xianping Xu, Lianzhui Li, Yong Ding.
5. **Section 12** - does not address welding of HPS 485W of Shear Link Grade steels. It is understood that these will be addressed in separate addendums to this WQCP. The Contractor is not approved to perform welding on HPS 485W or Shear Link Grade steels at this time.
6. **Item 12.8.2** - Personnel qualifications shall be submitted for CWI's described as "TBD" on Attachment A, ZPMC Quality Control Organization Chart.
7. The Department understands electrodes for the following PQR's will be submitted to the Engineer for approval in a future submittal or RFI. The Contractor is not approved to perform closed-rib welding at this time. The Contractor is not allowed to begin welding using WPS's developed from the following PQRs:
  - a. HP2006120 1G FCAW (Supercored 71H) on HPS
  - b. HP2006122 3G FCAW (Supercored 71H) on HPS
  - c. HP2006126-3 2F FCAW (Supercored 71H) on HPS
  - d. HP2006127 3F FCAW (Supercored 71H) on HPS
8. The Department understands additional information from the electrode manufacturer will be submitted in subsequent WQCP addenda to demonstrate the following PQR's for GMAW on the closed-rib PJP welds are operating in the spray transfer mode:
  - a. HP2006136-1 1G GMAW (JM-56)
  - b. HP200782 1G GMAW (SM-70)
  - c. HP2007370 1G GMAW (JM-56)
9. Additional testing shall be submitted in subsequent WQCP addenda to support the following PQR's which detail AWS D1.5 standard joint B-U2a-GF in the 2G position. This joint is pre-qualified only in the 1G, 3G and 4G positions. The following WPS's are not approved at this time:
  - a. WPS-B-T-2232-B-U2a-F
  - b. WPS-B-T-3212-B-U2a
  - c. WPS-B-T-4212-B-U2a
10. Welding of HPS 485W to non-shear length grade A709 gr. 345 using SMAW E7018 electrodes requires additional testing. The Department understands this testing is currently being conducted and will be submitted in future WQCP addenda. The following WPS's are not approved at this time:

- a. WPS-B-P-4211, 4212, 4213, and 4214-TC-U4b
  - b. WPS-B-P-4211, 4212, 4213, and 4214-TC-U4c
  - c. WPS-B-P-4211, 4212, 4213, and 4214-TC-U5b
  - d. WPS-B-P-4211, 4212, 4213, and 4214
  - e. WPS-345-485-SMAW-1G (1F), 2G (2F), 3G (3F), and 4G (4F)-1-Repair
11. The Department understands electrodes for the following WPS's will be submitted to the Engineer for approval in a future submittal or RFI. The following WPS's are not approved at this time:
- a. WPS-B-T-4231, 4232 and 4233-TC-U4b-F
  - b. WPS-B-T-4231, 4232 and 4233-TC-U4c-F
  - c. WPS-B-T-4231, 4232 and 4233-TC-U5-F
  - d. WPS-B-T-4131, 4132 and 4133
  - e. WPS-345-485-FCAW-1G (1F), 2G (2F), and 3G (3F)-1-Repair
12. The Department understands a single closed-rib WPS will be submitted showing the actual joint configuration and combination of processes and include the parameter variation established during the Closed-rib Weld Procedure Trials. The following WPS's for welding the Closed-rib to Deck PJP weld cannot be approved until the Contractor completes the Closed-rib Weld Procedures Trials described in the Special Provisions:
- a. WPS-B-T-2342-U1 and U2 (U-rib)
  - b. WPS-B-T-2141-U3 (U-rib)
  - c. WPS-B-T-2322-U1 (U-rib)
13. Additional testing is required to support WPS-B-T-223(2)1T. The Department understands PQR HP2006117-2 is currently in process and will be submitted in a future WQCP addendum. WPS-B-T-223(2)1T is not approved at this time.
14. Additional testing is required to support WPS-B-T-2221-B-U3c-S-1, L2c-S-1, L2a-S-1, U4b-S-1, U4a-S-1, and U5-S-1. The Department understands PQR HP200748 is currently in process and will be submitted in future WQCP addenda. The WPS is not approved at this time.
15. The Department understands the visual acuity information for ten individuals included in Section 4.3 of the WQCP will be included in a subsequent addendum.
16. **Supplementary Ultrasonic Testing Procedure to Verify Depth of Penetration of Partial Joint Penetration U-rib Welds** - This section was not reviewed. The Department understands that the enclosed procedure is still under development and additional information will be provided in future submittals. The procedure for testing the Closed-rib to Deck PJP weld cannot be approved until the Contractor completes the Closed-rib Weld Procedures Trials described in the Special Provisions. Final approval of this procedure will be based upon successful demonstration of accuracy.



Please note that The Department has changed the word "should" to "shall" in the WQCP to be clear and unambiguous with respect to the basic methods that will be followed to ensure fabrication quality and consistency. However, the Contractor has the option to change to different methods, techniques, or procedures as long as they are adequately documented and approved to ensure the engineered quality of the fabricated product is sustained.

The Department understands the heat straightening techniques listed in Section 11 provide a strategy to describe the patterns of heat that will be used in general scenarios where distortion is likely to occur. Since the actual distortion that occurs will likely include one or more of the scenarios listed, any individual or combination of the heating patterns and/or "spot" heating described are pre-approved for use.

With regards to the Heat Straightening Control Procedure, the Department has also identified items for your consideration that may improve the usefulness of the WQCP document. These items do not require action, but are offered as suggestions. It is ultimately the Contractors decision whether to incorporate these comments.

- **Item 11.1.2:** Consider using figures to illustrate how the flatness tolerances are incorporated across the entire width of length of plates and stiffeners. See attachments.
- **Item 11.2.1.1.b:** Flatness checks utilizing a 1-meter straight edge may not be sufficient to determine if the out of flatness tolerances specified in the contract have been exceeded.
- **Item 11.2.7:** The Contractor is encouraged to consider performing straightness checks and heat straightening progressively as each tower shaft is welded on.
- **Item 11.2.3:** The Contractor should consider how the accuracy of infrared temperature unit or surface pyrometer will be determined. The Department suggests the use of two temperature indicating crayons, one at 1100 °F and one at 1200 °F.

Also note that the section titled "Corrective and Preventative Action" was not required and was not reviewed.

The Department recommends face-to-face discussions with ABF and ZPMC personnel in Shanghai within the next two weeks to resolve any questions regarding comments contained herein. Further, it is recommended a separate meeting be held in Shanghai to discuss recommendations related to distortion control and Section 11 of the WQCP to ensure potential impacts to fabrication are minimized.

Sincerely,



GARY PURSELL  
Resident Engineer

Attachments

cc: Rick Morrow, Brian Boal, Mark Wood, Jason Tom, D. Coe, Stanley Ku, Peter Siegenthaler  
file: 05.03.01, 55.0054